Time: 1 Hours **Marks: 25**

Q1 . Attempt ANY TWO from the following.

i) Construct a labelled molecular orbital diagram for the divanadium molecule. Calculate the bond order and explain its magnetic property. 4

ii) By applying the concept of hybridization, derive the wave functions for the hybrid orbitals of Boron trichloride molecule. 4

iii) Explain the bonding in CO_2 molecule on the basis of molecular orbital theory. Draw the molecular orbital diagram showing the distribution of electrons in various molecular orbitals. 4

iv) What are Vander Waals forces of attraction? Explain various dipole attractions. 4

Q2 . Attempt ANY TWO from the following.

i) Construct the group multiplication table for C_3V point group. 4

ii) Describe representation with Cn matrices. 4

iii) State the meaning of Mullikan's symbols. 4

iv) Draw the character table for C2V point group. 4

Q.3. Attempt ANY THREE from the following.

i) Draw the Lewis dot structure for CO molecule. Give all possible resonating structures. Predict the most favourable structure. 3

ii) Explain the structure and bonding of [Ti $(CO)_4$] molecule. 3

iii) State rules for the construction of resonating structures with the suitable examples. 3

iv) Write the point groups of following molecules. 3
H_2S, PCl_3, t-H_2O_2

v) Define subgroup. Give its characteristics. 3

vi) What is non abelian point group? Explain with example 3

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